

The Equation Generator for the Archimedes



Computer Concepts Ltd

SERIAL NUMBERS 003615

Equasor



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1. Introduction

$$x = -\frac{R}{2L} \pm \frac{1}{2} \sqrt{\frac{R^2}{L^2} - \frac{4}{LC}} \qquad \lim_{\delta \rightarrow 0} \frac{\delta y}{\delta x}$$

Equasor is an equation building application developed specifically for the Archimedes range of desktop computers.

Much of the difficult and tedious work in creating complex equations is completely automatic. For example, enclosing brackets automatically increase or decrease in size to match the text inside them. Limits and powers are automatically scaled to 75% of the size of the preceding text. Many arithmetic functions (such as square root) can be selected simply by clicking on an icon.

Once an equation has been created, it can be saved as a graphic 'Draw File'. It can then be incorporated in any RISC OS application supporting this file format (most do).

You will find that you are very quickly able to create complex equations. (And, to help you even more, there is a brief tutorial in this manual.)

If you have used Computer Concepts' document processor packages, Impression and Impression Junior, you will find many of the concepts are already familiar to you. You will find more information later in this manual on using Equasor with Impression and Impression Junior.

About this manual

This manual is organised as follows:

- | | |
|----------------------|--|
| Introduction | This describes some of the concepts and basic building blocks of Equasor. You should read this before using Equasor. |
| Installation | How to install the software onto your Archimedes or BBC A3000. |
| Using Equasor | Brief details of how to use Equasor. Refer to this section if you are not sure which facility to use. |
| Tutorial | You are taken through creating a sample equation which uses examples of the facilities available to you. |

This chapter contains a number of useful tips on using Equasor. You will probably find it helpful to read through this chapter even if you don't build the sample equation.

The next three sections describe in detail the facilities available in Equasor.

Tools

Main Menu

Program menu

Appendix 1 A complete list of the characters available in the *MathGreek* font supplied as part of the Equasor package.

Appendix 2 A list of short-cuts available from the keyboard.

Help desk

We hope that you have no difficulties using Equasor. However, if you do and cannot find the answer in this manual, then we operate a technical help-desk. It is available Monday to Friday, between 1.30 p.m. and 4.30 p.m. on 0442 63933. You will be asked for the serial number at the top of your registration card so remember to keep a note of it. You may also be asked for the version number of the Equasor software. To find this, refer to the section in **Main Menu** describing the **Info** box.

This service is only available to you if you have returned the registration card supplied with Equasor.

Archimedes and A3000

Where we talk of the Archimedes we mean all models of the Archimedes range plus the BBC A3000.

Typographic conventions

In this manual we use these conventions:

Menu options

Where you can choose an option from the menu, the name of the option is shown in **bold**: e.g. **Save equation**.

Keyboard characters

Characters you type on the keyboard are shown in *italics*.

Return means the key marked 'Return'

Space means the Space Bar

F1 to *F12* means the function keys along the top of the keyboard

Ctrl-A means hold down the *Ctrl* key and type *A* or *a*

Shift-A means hold down the *Shift* key and type *A* or *a*

←, ↑, →, and ↓ are the four arrow keys to the left of the numeric keypad.

Concepts and building blocks

This section describes some of terminology used in Equasor.

Text

We use **Text** as shorthand for characters typed on the keyboard, selected directly from the MathGreek font or from the operators display, or entered from any other source.

Equation

We use **Equation** as shorthand to mean any block of text that forms a distinct entity. It could be a conventional equation or a part of one or a formula – Equasor does not distinguish between any of these.

Document

You can think of a document as a sheet of paper. You can create several separate equations on a document exactly as you can on a sheet of paper. You can change an equation without affecting any others on the same document.

Unlike a sheet of paper, you can slide equations around on a document either to make more space for another equation or to create a more logical layout.

Clipboard

This is an invisible temporary store and is used like a physical clipboard. You can cut or copy a piece of text from an equation (or even a complete equation) and put it on the clipboard. That text can then be transferred to another part of the same document or to a different document.

The clipboard can only hold one item at a time. Placing something on it overwrites any existing contents.

Mouse buttons

We use the normal Acorn terminology:

Select is the left-hand mouse button.

Menu is the centre button.

Adjust is the right-hand button.

Where we don't specify a button, use **Select**.

In menus and dialogue boxes you can use either **Select** or **Adjust**.

- If you use **Select**, the requested action is performed and the menu or dialogue box is removed from the screen.
- If you use **Adjust**, the same action is performed but the menu or dialogue box remains on the screen. This allows you to continue choosing options from the menu or changing the dialogue box.

Mouse pointer

The mouse pointer can have two forms.



- For entering or editing text, it is the conventional arrow-shape.



- For dragging text around on the document or the document around in the window, it is hand-shaped.

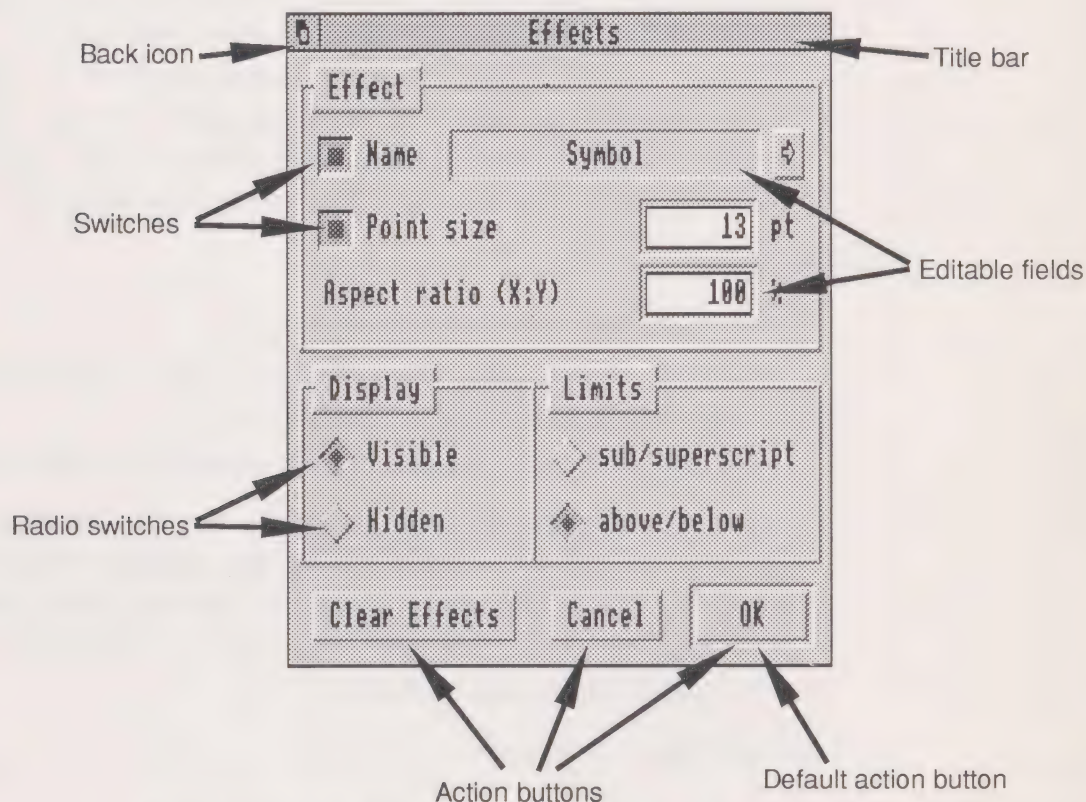
Text cursor

This is the conventional 'I' shaped cursor. You can move the cursor either using the arrow keys on the keyboard or by positioning the mouse pointer and clicking **Select**.

You can only add text at the cursor position.

Using dialogue boxes

Dialogue boxes allow you to make several changes at once. An example is the Effects dialogue box:



The dialogue box has a Title bar and Back icon like a conventional window but does not have a Close icon nor can it be rescaled.

Action buttons

These are grouped along the bottom of the dialogue box.

Changes that you make in a dialogue box do not immediately change the document. So, if you make a mistake or change your mind, click on the **Cancel** button to discard any changes you have made in the dialogue box.

The document only changes when you click on **OK** or, for this dialogue box, **Clear effects**.

The **OK** button is surrounded by a yellow moat to show that it is the **default action button**. This means that pressing the *Return* key on the keyboard has the same effect as clicking on the button.

If you click **Select** on one of the action buttons, the requested action takes place and the dialogue box is closed and disappears from the screen.

If you click **Adjust** on one of the action buttons, the requested action takes place but the dialogue box remains on the screen. This is useful if you want to make a series of changes and want to see the effect of making each change. If you click **Adjust** on the **Cancel** button, any changes you have made are discarded and the dialogue box shows the original values.

Editable fields

There are two types of editable fields

- those where you can choose from a limited range of options (usually a list of fonts), and
- those where the range is wide (usually numeric values).

Some editable fields have a switch to the left of their name. Before you can enter a value into the editable field, this switch must be **on**. When **on**, it appears recessed into the dialogue box and has a red square in its centre. Click on a switch to alternate between **on** and **off**.

Limited range of options



In the illustration, **Font name** is an example where you can choose only from the available fonts and so have a relatively limited range of options.

To display the menu, click on the arrow to the right of the editable field.

Choose a new option in the usual way by clicking on its name on the menu.

To remove the menu from screen, click anywhere on the visible part of the dialogue box.

Wide range of options



These editable fields allow you to type in a value, usually numeric. To select, position the mouse pointer over the box and click **Select**.

You can move between editable fields of this type by

- using the \uparrow and \downarrow keys, or
- using *Shift-Tab* and *Tab*.

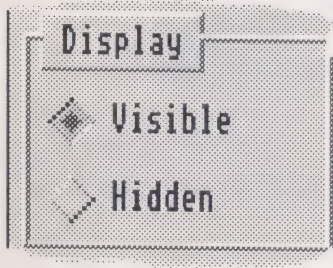
Shift-Tab and \uparrow moves to the left or up; \downarrow and *Tab* moves to the right or down. If the bottom-right editable field is selected and you press the \downarrow or *Tab* keys, the cursor moves to the top-left editable field. Similarly, if you press the \uparrow or *Shift-Tab* keys, the cursor moves from the top-left editable field to the bottom-right editable field.

Ctrl- \uparrow moves the cursor directly to the top-left editable field. Similarly, *Ctrl- \downarrow* moves the cursor directly to the bottom-right editable field.

You edit the contents of an editable field in the conventional way:

- use the \leftarrow and \rightarrow keys to move the cursor to the left or right,
- use the *backspace* key to delete the character to the left of the cursor,
- use *Copy* to delete the character to the right of the cursor,
- use *Ctrl-U* to clear the box,
- enter new text by typing on the keyboard.

Radio switches



These are small diamond shaped switches displayed in groups of two or more and are used to select one option from several in the group. In the diagram there are two such groups:

Visible or Hidden, and
sub/superscript or above/below.

The selected switch is shown with a small red diamond in a dark grey surround. (In the illustration, the selected switch is **Visible**.) The other switches are shown in light grey.

Only one switch from the group can be selected at any time. If you select a switch (by clicking on it), the previously selected switch is deselected.

Basic typography

Typography (the appearance of printed text) is a vast subject. There are, however, a few basic words and phrases which need explaining.

Font or typeface

This describes the appearance of the text. A font is carefully designed so that all the characters in it fit neatly with each other in any combination. There are hundreds of fonts available; often the differences between them are very slight.

Font family

It is unusual for a font to have only one style (unless it contains symbols or other specialised characters). Normally, several variations are available and these variations form the **family** of the font. For example, the Trinity family supplied with the Acorn font manager has four fonts:

Trinity Medium

Trinity Medium Italic

Trinity Bold

Trinity Bold Italic.

Trinity is a small family – the Helvetica family can have over 30 fonts.

Font size

The font only describes the appearance of the characters and not their height. In fact, a font can be almost any size from

very small to very large. The height of a font is measured in *points* (abbreviated to *pt*); a *point* is 1/72nd of an inch (about 0.35 mm). The font height (or *font size*) is not the height of the characters. (Clearly the character **a** has a different height to the character **A**.) Instead, each character is enclosed by an imaginary box of a constant height and this box is the height of the font size. (In this manual, we refer to this imaginary box as the *character bounding box*.)

When deciding which font size to use, remember to allow for any reduction in size when printing. Theoretically, the minimum size for characters to be readable is 1mm high (about 3pt). However, 3pt characters are tiny and 6pt is a more practical minimum to use.

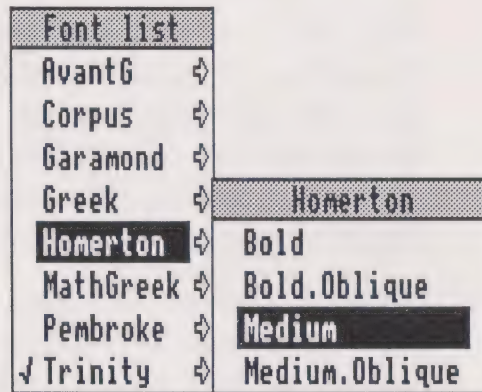
Character width

The width of a character can be either

- Constant for all characters so that **M** occupies the same width as **i**. Such fonts are called *mono-spaced* fonts; the *Corpus* font is an example of this.
- Variable so that **M** occupies more space than **i**. Such fonts are called *proportional* fonts and are easier to read both on the screen and when printed. *Trinity* is a proportional font. (This manual uses a proportional font.)

The power of the computer can be used to stretch or compress characters to make them wider or narrower. This changes the *aspect ratio* which is the ratio of the current width to the original width. (100% means the character is its original width.) The larger the ratio above 100%, the more the character has been stretched.

The Font menu



To make it easier to select a font, hierarchical menus are used. Initially you are presented with a menu of the font **families** (*AvantG*, *Corpus*, *Garamond*, etc.). Slide the mouse pointer over the arrow to the right of the family you want; this displays a submenu showing the font variants (*Bold*, *Bold oblique*, etc.).

The currently selected font is shown with a tick against its name (it is *ticked*). (In the illustration, the currently selected font is one of the Trinity family.)

To select a font, click on its variant name in the submenu. (In the illustration, *Homerton Medium* is about to be selected.)

2. Installation

You should have received:

- this manual,
- a customer registration postcard,
- a floppy disc.

The floppy disc contains two files:

- *!Equasor* – the Equasor application
- *MathGreek* – a new font containing the Greek alphabet and mathematical and other symbols.

We recommend that you do not use this disc as your working disc. Instead, you should copy its contents and then store it in a safe place.

If you are uncertain about how to copy files, you will find full details in the *User Guide* supplied with your Archimedes.

Installing *!Equasor*



!Equasor

Copy *!Equasor* to either another floppy or, if you have a hard disc, a suitable directory.

Installing *MathGreek*



MathGreek

Your Archimedes should already have a *!Fonts* file containing a basic set of outline fonts, including *Trinity Medium* and *Trinity Medium Italic*. If you do not have these fonts, they are available from Acorn Computers or any good supplier.

Because *!Fonts* is an application directory you cannot display its contents in the normal way by double-clicking on its icon. This would merely load it.

Instead, hold down the *Shift* key and then double-click on the *!Fonts* icon. This opens a conventional directory display. Copy *MathGreek* into that directory.

Now double-click on the *!Fonts* icon to load it. You will see *MathGreek* among the font names that are loaded.

Font cache

You have to set-up the font cache. (The font cache is the area in memory where information on the fonts currently in use is stored.)

There are two values to set-up:

FONTSIZE - which is the minimum amount of memory to reserve for the font cache, and

FONTMAX3 - which sets a limit on the size of characters to be stored in the font cache. (Large characters are only rarely used and it is wasteful of space to cache them.)

FONTSIZE

There are two possible ways to change FONTSIZE:

- using the RISC OS task manager, or
- using the command line.

If you use the task manager, you only change the size temporarily. Any change is lost when you switch off the Archimedes. To use the task manager, you:

1. Click on the task manager's icon (which is usually the right-most icon on the icon bar).
2. Choose **Task display**.
3. Scroll down until you see **Font cache** (it is in the block headed **System memory allocation**).
4. Use **Select** or **Adjust** to set the required value for the cache. The cache instantly adjusts to the new value; there is no OK button to click on.
5. When satisfied, click on the Close icon to close the task manager window.

If you use the command line, any change is permanent. To use the command line, press function key F12. Type in

*CONFIGURE FONTSIZE 80K

Press *Return* to enter the new value. Press *Return* a second time to return to the normal desktop mode.

FONTMAX3

The value can only be changed via the command line. Press function key F12. Type in:

*CONFIGURE FONTMAX3 30

Press *Return* to enter the new value. Press *Return* a second time to return to the normal desktop mode.

Registration card

Don't forget to fill out and return your Registration Card. Remember, our help desk and free update service are only available to registered customers.

3. Using Equasor

This section describes how to use the various options available to you. Examples of their use are shown in the *Tutorial* section. Only brief details are given in this section; the descriptions refer you to other sections of this manual for full details.

The various concepts, such as documents and the clipboard, are described in *Introduction*.

This manual assumes that you are familiar with using standard RISC OS applications. If you are not, you will find full details in the *User Guide* supplied with your Archimedes.

Equasor's menus

Equasor	
Document	⇄
Edit	⇄
✓ Tools	
Symbols	
Operators	⇄
Style	
Effects	
Misc	⇄

There are two menus in Equasor.

Most functions are controlled by the **Main Menu**. To display this, move the mouse pointer over an Equasor window and click **Menu**. If we say choose a menu option and don't specify which menu, we are referring to the Main Menu.

Equasor	
Info	⇄

New view	⇄
Preferences	

Quit	

The **Program Menu** controls functions of the Equasor application rather than individual documents. To display this menu, move the mouse pointer over the Equasor icon on the icon bar and click **Menu**.

Loading Equasor

You load Equasor in the normal way for an application. That is, double-click on its icon to install it on the icon bar.

Opening a new document

Click once on the Equasor icon on the icon bar. This creates a new document and opens a conventional window onto it. The title bar shows the name of the document and the scale of the window. The default scaling is set in **Preferences** in the Program Menu; you can increase or decrease the scale of your view onto the document at any time.

The default document size is 210 mm × 297 mm (A4 paper size). If you want some other size, use the menu option **Paper limits**. (This is in the **Misc** menu.)

Also displayed is **Tools**. This is described in its own chapter.

Loading an existing document

There are two ways to load an existing Equasor document:

- Dragging its icon from a directory display and dropping it on the Equasor icon on the icon bar.
- By double-clicking on its icon. If Equasor has not already been loaded, this is done automatically.

The editing window

The Equasor editing window is a conventional RISC OS window. The Back icon, Toggle Size icon, and Adjust Size icons and the scroll bars and scroll arrows all operate as normal. (If you are unsure of the function of any of these, refer to the *User guide* for the Archimedes.)

The Close icon operates differently to most other Archimedes applications. When you click on it, the document is not deleted from memory as it would be in, for example, *!Draw*. Instead, the editing window is closed but the document is retained in memory. To reopen a window on the document, use the Program Menu option **New view**.

You can have up to eight documents loaded in memory at the same time. However, you can only make changes to one document at a time; that document is called the **open document**. To differentiate the editing window of the open document, its title bar is coloured yellow. To make another document the open document, you need only click in its window.

Starting a new equation

Position the mouse pointer over the Equasor window and click the **Menu** mouse button to display the Main Menu. Choose **Edit** then **New equation**.

The mouse pointer tracks a pair of cross-wires. Use the mouse to position the cross-wires where you want to start the equation and then click on **Select**.

The cross-wires disappear and the text cursor appears above the pointer.

You can create a second equation either by using **New equation** or by pressing *Return*. Using *Return* allows you to create a series of equations – this is described later in more detail. (See *Creating a series of equations* later in this chapter.)

Entering text

Except for certain functions in **Tools**, all text is entered at the cursor. Therefore, you may need to reposition the cursor before entering text. (See *Moving around an equation* later in this chapter.)

You can enter text from

- the keyboard,
- the tools display,
- the symbols display,
- the operators display.

The keyboard

Use the keyboard to enter alphabetic, numeric and simple arithmetic functions such as + or -.

All text entered from the keyboard is in one of the default text styles. Alphabetic characters are normally displayed in italics; other characters in an upright typeface. You can change the typeface used and the size of the characters – this is described later in *Styles*.

Tools display

The tools display is described fully in the chapter *Tools*. It allows you to:

- select functions such as divide, square root and integral
- add accents above or below characters
- insert rescalable brackets
- enter powers.

To select any of the tools click once on the appropriate icon.

You can also switch between text entry and move modes using the tools display.

Symbols display

The symbols display is described fully in the chapter *Symbols display*.

Its main use is to select characters from the *MathGreek* font. This font provides the Greek alphabet, a comprehensive set of

mathematical symbols (such as \pm and \div) and a miscellany of other useful characters.

The complete MathGreek font is shown in Appendix 1.

You can add up to seven more fonts to this display. A font can have up to 255 characters, but characters 128-255 are not easily accessible from the keyboard. The symbols display provides you with a simple way to select any character in the font.

Operators display

Use this to insert operators such as **log** and **tan**. To select an operator, click once on the appropriate icon.

Unlike characters typed on the keyboard, operators are not displayed in italic but in an upright typeface (the *Operators* font). If required, this typeface can be changed using the **Styles** menu option.

You can also type a string of characters into the operators display and then insert that string into an equation. This is a quick way of inserting text in the same font as the operators.

Styles & Effects

The convention in equations is that variables are shown in *italic* and all other characters in a normal upright style. The two default type styles in Equasor (*Variables* and *Operators*) follow this convention. These are **Styles** and are controlled by the Styles dialogue box.

However, you may want to use larger or smaller characters or a different font in a part of an equation. Or you may want to emphasise one equation in a document. To do this, you overlay the area you want to change with an **Effect**. These are controlled by the Effects dialogue box.

Styles

If you change either of the default type styles and click the **OK** button in the dialogue box, all the text that uses that type style is altered to match those changes. If you also have Effects applied, these may mask the changes.

This is a very powerful feature as it lets you experiment with the appearance of a document. If you do not like the change, you can easily restore the original values.

Any Style changes you make apply only to the currently selected document. They have no effect on any other Equasor documents that may also be loaded.

Effects

These are used to change a part of the text in a document. Once Effects are applied, you cannot modify them although you can cancel them or overlay them with other Effects.

You can only apply an Effect to a selected region of text. Therefore, to apply an Effect over an entire equation, first select it. (**Select all** is the easiest way to do this.)

To remove all the effects from an equation, you:

1. select the entire equation (use **Select all**),
2. display the Effects dialogue box,
3. click on the **Clear effects** button in the dialogue box.

Changing Styles & Effects

With both Styles and Effects you can change:

- The font. (A font is the character outlines.) The two default fonts (*Trinity Medium* and *Trinity Medium Italic*) are relatively light typefaces and sometimes a bolder typeface (such as *Trinity Bold*) may be more suitable. You can use any of the fonts in your *!Fonts* directory.
- The font size. The default font size is 18pt (a point – pt – is 1/72 of an inch) which may be too large if printed full size but is ideal if printed reduced in size.
- Aspect ratio. Changing this makes the characters wider (greater than 100%) or narrower (less than 100%).

The equations in this manual are shown reduced to approximately 10pt.

Scaling the window

When you have entered some text you may find that you want to enlarge your view of it. To do this, change the scaling of the window; choose **Scale view** on the Main Menu to display a dialogue box. Scalings larger than 100% enlarge the image; smaller than 100% reduce the image.

This only changes the size of the image on the screen. The size of the characters in the equation does not change. If you want to change the character size, use the **Styles** menu option.

Moving around an equation

You can either

- use the arrow keys on the keyboard ($\leftarrow \uparrow \downarrow \rightarrow$), or
- move the mouse pointer to a new position and click on **Select**.

You can use the arrow keys only to move around within an equation and not between equations. The mouse pointer can be used for both.

Selecting text

Before you can move or copy a section of text or apply certain functions (such as square root), the relevant region of text must be selected. Selected text is always shown *highlighted* (that is, light characters on a dark background).

Selecting a single character

If you position the mouse pointer over a character and press and hold down **Select**, after about a second the character is selected.

As described in the *Introduction* chapter, each character is enclosed within an imaginary box. You just need to position the mouse pointer within this box; it does not have to be exactly over the character.

You can also select the character to the left of the cursor by typing *Ctrl-B*

Selecting an expression

Expressions are groups of characters entered in a consistent fashion. For example, this equation

$$a + b = c + \frac{d}{e} + f + gg^{2.5} + \int_{3.5}^{4.5} h + i$$

has eleven expressions:

- $a + b = c +$
- d
- e
- $+ f + g$
- g
- 2.5
- $+$

- the integral sign
- 3.5
- 4.5
- $h + i$

To select an expression, position the mouse pointer anywhere within it and double-click on **Select**.

Variable length selects

There are three of these:

- Position the cursor at the start of the region. Move the mouse pointer to the end of the region and then click on **Adjust**.
- Position the mouse pointer to the start of the region. Press and hold down **Select** and drag the mouse pointer to the end of the region. As you move the mouse pointer, you will see the outline of a rectangular box appear. When the box encloses all the text that you want to select, release the **Select** mouse button. The box disappears and the text is shown highlighted.
- This method works from the existing cursor position. (The cursor must have been in position for at least a second.) Position the mouse pointer over the cursor. Press and hold down **Select** and drag the mouse pointer to the end of the region. As you move the mouse pointer, you will see the text becomes highlighted. When the mouse pointer is at the end of the region, release **Select**.

Deleting text

You can delete individual characters by positioning the cursor immediately after them and then pressing *Delete*.

You can delete a larger region of text by first selecting it and then from the Main Menu choosing:

- **Cut**, or
- **Delete**.

Cut removes the text and puts it on the clipboard. This allows you to either insert it in a new position or, if you made a mistake, replace it in its original position. If the text is not required, it can be left on the clipboard. It remains there until something else is placed on the clipboard.

Delete removes the text and discards it. No copy is kept and you cannot undo a delete. For this reason, we recommend

that you normally use **Cut** to remove unwanted text. Delete is useful if you already have something on the clipboard that you want to keep.

Moving text and equations

To move text use cut and paste. To move an entire equation you can either cut and paste or drag the equation around on the document.

Cut and paste

Cut and paste lets you move text around on a document or between documents.

Before you can use cut and paste (or copy and paste), you must first select the required region of text. The easiest way to select an entire equation is to use the menu option **Select all**.

Cut removes the selected text to the clipboard; **Copy** leaves the text untouched in the equation and just puts a copy on the clipboard.

Position the cursor to where you want to make the insert. (If necessary, create a new, empty equation.) From the Main Menu choose **Edit** and then **Paste**. This copies the contents of the clipboard into the document at the cursor position.

Dragging an equation

Click on the hand symbol in **Tools**. The mouse pointer changes to a hand. Move the hand over the required equation and press and hold down **Select**. Equasor draws an outline box around the equation to show that you can move it.

While you keep **Select** pressed you can drag the outline box around the document. When moving the box, you do not have to avoid other equations but can slide over them without changing them. When you have positioned the box to its new location, release **Select**.

The mouse pointer remains hand-shaped until you either click on the arrow symbol in **Tools** or choose **New equation** from the Main Menu. This lets you make a series of moves.

Creating a series of equations

Often several equations are required to line up, like this:

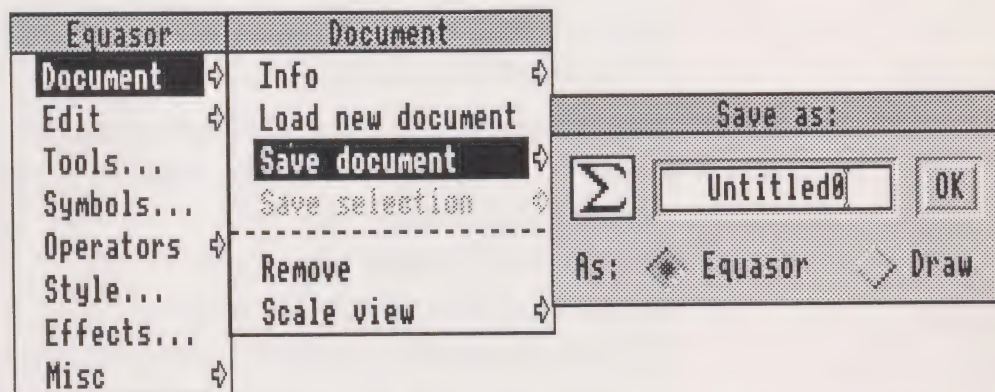
$$\begin{aligned} a &= b^2 + \sqrt{c} \\ &= 2^2 + \sqrt{9} \\ &= 4 + 3 \quad = 7 \end{aligned}$$

Equasor provides a simple way of doing this by using the *Return* key. There are three options (set in **Preferences** in the Program Menu):

- create a new equation and align the cursor with the = in the old equation ($a=b^2...$ in the example above), or
- create a new equation and align the cursor with the left-most character in the old equation (a in the example), or
- create a new equation and align the cursor with the right-most character of the old equation (c in the example).

The equations remain independent and so, if you edit one of them, it may go out of alignment with the others.

Saving



Experience shows that you can never save files too often. This applies to all files and not just Equasor's. Try to get into the habit of making regular saves and back-ups. If you are going to make any major changes, always save the document before you start in case you make a serious mistake. You should also routinely save back-up files on separate floppy discs.

You can save either:

- the entire document, or
- only the selected region or equation.

Full details of saving can be found in the **Main Menu** section under **Save document** and **Save selection**.

In-memory transfers of both entire documents and selected regions are supported. (That is, you can drag the Save icon from Equasor and drop it directly onto another application. This avoids having to go through the intermediate step of saving to disc.)

Equasor and Impression

Equasor files can be easily imported into Impression and Impression Junior.

Impression issue 2.05 (or later) and Impression Junior issue 1.05 (or later) accept files in either Equasor or Draw format. Equasor format is best because it lets you transfer equations back into Equasor if more editing is needed.

Earlier versions of the Impression software can only accept Equasor files in the Draw format. You can get a free upgrade if you return disc 1 from Impression or Impression Junior to Computer Concepts.

In-memory transfers are the easiest way to transfer files to and from Impression. That is, you drag the Save icon from Equasor and drop it onto either a graphic frame or a null (empty) frame in Impression.

This assumes that you have sufficient room in memory for both the Equasor and Impression applications and the document. If you do not, then:

1. save the Equasor file to disc,
2. quit Equasor to release memory,
3. load Impression and the required document,
4. drag the file icon from the directory window onto a graphic or null frame in the document.

In Impression, equations can be inserted into the body of the text using embedded frames. (Impression Junior does not have embedded frames.) Unlike local frames, embedded frames always keep their position within a block of text, regardless of any edits you may make. To insert an embedded frame into some text, you:

1. create a local frame of the required size (although you can later resize embedded frames if necessary),
2. cut that frame to the clipboard,

3. position the cursor where you want to insert the embedded frame,
4. insert the embedded frame using the menu option **Embed frame** (which is in the **Frame** menu).

In Impression Junior use local frames to hold equations produced by Equasor.

Use Impression's **Alter graphics** dialogue to rescale equations within a frame, if necessary. This dialogue box can be displayed very easily by double-clicking on a graphics frame.

4. Tutorial

This brief tutorial shows you how to use the main facilities of Equasor. Often only one of several similar facilities is described; we tell you which other facilities a description applies to. The equation that this tutorial builds is:

$$\sum_a^b \frac{c}{\sqrt{d+e+f} + g^{\frac{1}{2}}} = \tilde{h} - i(\log \theta)JK$$

It is probably mathematical gibberish but it does illustrate how to use Equasor.

¶ In this tutorial, paragraphs like this give you additional information on using Equasor.

Loading Equasor

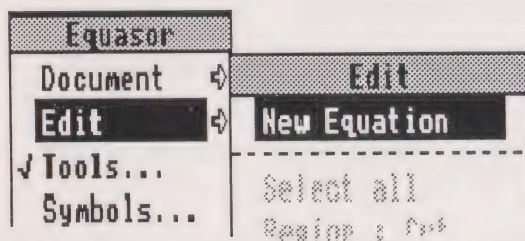
Display the *!Fonts* icon in a directory window. You do not need to load *!Fonts* – Equasor reads it when required. If *!Fonts* is on a floppy disc, you may be prompted later to swop discs.

Display the *!Equasor* icon in a directory window. Double-click on its icon to load it onto the icon bar. (Double-click means press and release the mouse button twice in quick succession.)

Click on the Equasor icon on the icon bar. This opens a new Equasor window with the name *Untitled0*.

Starting a new equation

Position the mouse pointer over the Equasor window. Click on the **Menu** (centre) mouse button to display the Main Menu.



On the menu, choose **Edit** then **New equation**. The mouse pointer now tracks a pair of crosswires. Position these slightly left of centre in the window and then click **Select** (the left-hand mouse button). The crosswires disappear and are replaced by the normal text cursor.

Picking a function

Move the mouse pointer over the Tools window and position it over the summation symbol (Σ). Click on **Select** and Σ is inserted into the equation at the cursor.

The cursor moves to below Σ , ready for you to type in a limit. Type a on the keyboard and a is inserted into the equation. (There may be a few seconds delay whilst the fonts are loaded from disc.)

Now move the cursor above Σ by pressing the \rightarrow key on the keyboard.

Type b to insert the second limit into the equation.

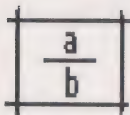
¶ *This is how you insert the Product, Integral, and Ointegral symbols and their limits.*

¶ *You can also move between the limits using the \uparrow and \downarrow keys. These keys move the cursor to the start of the limit.*

Building the division

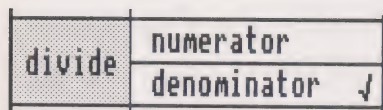
The cursor is currently to the right of the b . If you typed in more characters, they would appear next to the b which is not what this equation requires. So, press \rightarrow again to move the cursor to the right of the Σ . Now type c .

We now need to select c so that we can apply the division function. Move the mouse pointer over the c and press and hold down **Select** (the left-hand mouse button). In about a second, c is highlighted (displayed as a white character on a black background) to show that it is selected.



Move the mouse pointer over the Tools window and click on the divide icon.

c is deselected (it changes to a black character on a white background) and a dividing line is drawn under it. The cursor moves to the denominator position below the line. Notice that the Σ symbol automatically increases in size.



¶ *The dividing line can also be drawn above the existing text and the cursor moved to the numerator position. This is controlled by the Divide switch towards the bottom of the Tools window.*

¶ *You also apply the Square Root, RootN, and Powers by first selecting text and then applying the function. This tutorial uses Square Root and Powers later on.*

Type in $d+$. Notice in the equation that the $+$ is immediately to the right of the d .

Type in e . Notice that

- the dividing line is automatically extended to cover the whole of $d + e$, and
- there is now a space between d and $+$.

¶ *The spaces either side of the $+$ are defined by Spacing in the Styles dialogue box. You can make the spacings larger or smaller by changing the value of Spacing.*

Applying the Square Root

Move the mouse pointer anywhere over the expression $d+e$ and double-click on **Select**. This selects $d+e$.

Click on the Square Root symbol in the Tools window and it is applied to $d+e$.

The cursor has disappeared. Position the mouse pointer to the immediate right of e and click once on **Select**. The cursor reappears. If necessary, reposition the mouse pointer and try again. Do not use the \leftarrow and \rightarrow keys; the reason for this will be explained shortly.

¶ *You can position the mouse pointer anywhere on the e from its centre line to its immediate right. If you want to place the cursor between two characters, the mouse pointer can be positioned anywhere between their two centre lines.*

Now type $+f$. Notice that the horizontal bar of the square root symbol is continued over both characters. If you typed in more characters, the horizontal bar would continue.

We do not want the $+g$ covered by the square root so we must leave the function. Notice that, at present, the cursor is the same height as the horizontal bar. This tells you that it is still within the square root function.

Press the \rightarrow key once. The cursor does not move but it becomes smaller (the same height as the text). This tells you that you are now outside the square root function.

¶ *If you were to press \leftarrow again, the cursor would increase in size to show you that it was back inside the square root function.*

Applying the power

Type $+g$.

You must select the g before you can apply the power to it. You could position the mouse pointer over it and hold down

Select as you did to select c . Instead, use an alternative method:

- Position the mouse pointer below and to the left of g .
- Press and hold down **Select**.
- Keep **Select** pressed and drag the mouse pointer up and to the right. As you move the mouse, you will see an outline box appear.
- When the box encloses g , release **Select**.

This selects g . This method can be used to select any length of text (even the entire equation if necessary).

¶ *You can move the mouse diagonally in any direction for this select method.*

Click on the power symbol in the Tools window. g is deselected and the cursor moves to the superscript position.

¶ *To move to the subscript position, press ←.*

¶ *If you want the cursor to move first to the subscript position, use the Power switch towards the bottom of the Tools window.*

Type 1 .

Select the 1 and then click on the divide symbol in the Tools window.

Type 2 to complete the power.

Applying an effect

The $\frac{1}{2}$ would look better in smaller characters. We can apply an effect to over-ride the automatic scaling of these characters.

Select the $\frac{1}{2}$; use the same method as you used to apply the power.

Move the mouse pointer over the Equasor window and click on **Menu**. This displays the Main Menu.

Click on **Effects** to display the effects dialogue box.

If the switch to the left of **Point size** is **off**, click on the switch to set it **on**. (If the switch is **off**, it appears to be raised from the dialogue box. If **on**, it appears recessed and has a small red square in its centre.)

The editable field to the right of **Point size** will show the default point size. Click in the box and change it to **10**.

Click on the OK button to change the character size.

Adding the = sign

Position the cursor next to the 2.

We now have to leave the denominator position. Press the → key until the cursor moves to the centre line of the equation.

Type =

Adding accents

Type h and select it. Click on any of the accent symbols in the Tools window to insert that accent over the h .

Position the cursor after the h .

Type $-i$

Again, notice that initially the minus sign is to the immediate right of h and is then spaced out when i is typed.

We want to place the accent under the i so click on **below** in the Accents switch on the Tools display. The tick is removed from **above** and appears against **below** to show that it is now the selected option.

Select the i and apply any of the accents to it.

Position the cursor after the i .

¶ If you want to, you can apply accents both above and below a character. You can also stack several accents above and below each other.

Selecting an operator

Move the mouse pointer over the Equasor window and click on **Menu**. This displays the Main Menu.

Slide the mouse pointer over the arrow to the right of **Operators** to display the list of operators. To select any of the operators in this list, move the mouse pointer over it and click **Select**.

The operator is then inserted into the equation at the current cursor position. Notice that an upright text style is used; this is the *Operators* text style. If you want to use a different text style, use the Style dialogue box.

Inserting a character from the MathGreek font

Again display the Main Menu by clicking **Menu** over the Equasor window.

Click on the menu option **Symbols**. This opens a window displaying the characters in the MathGreek font. Notice that to reduce the size of the window, only part of the character set is displayed. To see the other characters, you can either scroll or resize the window. Notice also that a tick appears against the **Symbols** menu option name to show that the window is open.

To insert any of the characters into the equation at the cursor position, just click on that character in the Symbols window. In the sample equation we used θ but any symbol can be used.

Applying the brackets

Before you can apply the enclosing brackets, you must first select the region of text to be enclosed. You could use the box method already described, but we will use another method to show its use.

Position the mouse pointer over the cursor (which should be to the right of θ).

Press and hold down **Select**.

Keeping **Select** held down, move the mouse pointer to the left. As you move the mouse pointer, you will see the text becomes highlighted.

When you have the required area of text selected, release **Select**.

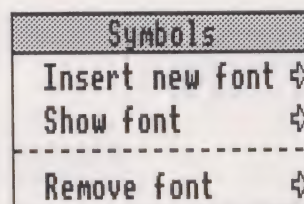
Click on any of the brackets symbols in the Tools display and they are placed either side of the selected text. Notice that the text is deselected by this action.

¶ You can also select text by moving the mouse pointer from left to right. We used right to left only because of the starting position of the cursor.

¶ You could also have inserted the brackets into the equation and then inserted $\log\theta$ inside them. You can use either method.

Adding a second font to the Symbols display

Move the mouse pointer over the Symbols display and click **Menu**. This displays a small menu:



Slide the mouse pointer over the arrow to the right of **Insert new font** to display a menu of available fonts.

Choose any of the text fonts (that is, not a symbols font like *Greek*) except *Trinity Medium* or *Trinity Medium Italic* (because these are already used in the equation).

This adds that font to the Symbols display.

Selecting characters from the second font

Click on **Next** in the Symbols display window. This displays the second font in the window.

¶ You could also have directly selected a font from the small symbols display menu by sliding the mouse pointer over **Show font**. This displays a menu of the fonts currently loaded. Choose a font from this menu in the conventional way by clicking on its name.

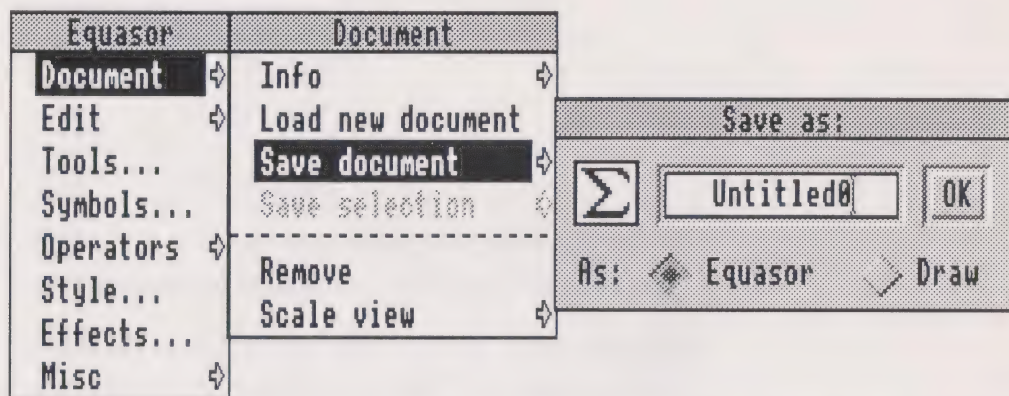
Click on a couple of characters in this second font to insert them into the equation. (We used *JK* but any characters can be used.)

Saving the document

Documents can be saved either to a suitable directory on a hard disc (if you have one) or to a floppy disc. Whichever you use for storing the equation, you must open the normal RISC OS directory window on it. If you are unsure about saving files to directories, refer to the *Archimedes' User Guide* for more information.

Click **Menu** over the Equasor window to display Main Menu.

Slide the mouse pointer over **Document** and then over **Save document**. This displays a small dialogue box.








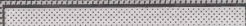


Change the name in the editable field from *Untitled0* to a name of your choice. (To clear the complete name in the editable field, type *Ctrl-U* or hold down the *Delete* key.)

To save the document, drag the document icon from the dialogue box and drop it on the RISC OS directory window.

The two save formats are described in detail in the **Main Menu** section under **Save document**.

¶ *You only need to drag the icon the first time the file is saved or if you want to save the document to another directory. To resave the document to the same directory, just click on the **OK** button in the dialogue box.*

5. Tools

 	Tools			
Σ			D/A	
\sqrt{a}	b/\sqrt{a}	$\frac{a}{b}$	a^b_c	
\sum_a^b	\prod_a^b	\int_a^b	\int_a^b	
\hat{a}	\tilde{a}	\check{a}	\acute{a}	\grave{a}
\bar{a}	\dot{a}	\ddot{a}	\vec{a}	\overleftarrow{a}
$[a]$	$|a|$	(a)	$\langle a \rangle$	$\{a\}$
limits	above/below			✓
	sub/super			
divide	numerator			✓
	denominator			
accents	above			✓
	below			
power	superscript			✓
	subscript			
				 

This window is displayed when you open a document. If you want to remove it from screen, click on the Close Icon. Click on **Tools** to restore it on screen. You can also drag almost the entire window off the sides or bottom of the screen.

When the window is first opened, only the top half of the tools are shown. To display the switches (**limits**, **divide**, **accents**, and **power**), increase the size of the window by either

- using the **Adjust size** icon (at the bottom right of the window), or
- clicking on the Σ symbol (at the top-left of the window). Use the Σ symbol to toggle the window between half size and full size.

All the functions, brackets and accents can be selected either by clicking on their icon or by using single key short-cuts from the keyboard. The functions have default short-cuts allocated; the brackets and accents do not. You can change this default set-up using the Main Menu. Where a default control short-cut exists, this is shown in the descriptions as, for example, *Ctrl-Q*. This means hold down the *Ctrl* key and type either *Q* or *q*.



Click on the hand symbol when you want to drag the document around in the window or an equation around on the document.

To drag an equation, position the hand over it and press **Select**. Equasor draws an outline box around the equation and you can drag that box around the window. When correctly positioned, release **Select** and the outline box disappears. You can slide the box over other equations.

To drag the document, position the hand over an unused part of the document. Press and hold down **Select** and the document then follows the hand. Release **Select** to stop dragging the document. You can position the document within the window more accurately by dragging than by using the slide bars at the side of the window.

You cannot edit text while the hand is displayed.



Click on the arrow symbol after dragging. The cursor changes back to the arrow shape and you can continue editing the document.



Design/Apply. This is described in detail at the end of this chapter.

The four symbols on the second row can only be applied to a selected region of text. Selecting text is described in *Using Equasor*.



square root. Keyboard short-cut: *Ctrl-Q*. The horizontal bar is applied over the whole of the selected region.



nth root. Keyboard short-cut: *Ctrl-N*. The cursor moves to the position **b** next to the root symbol.



divide. Keyboard short-cut: *Ctrl-D*. The default is that the selected region of text becomes the numerator and the dividing line is inserted below the selected region. This order can be reversed and the selected region become the denominator; use the **divide** switch (described later).



power. Keyboard short-cut: *Ctrl-P*. The **power** switch (described later) selects whether the cursor then moves to the **b** or the **c** character position. The default is the **b** position. (**b** and **c** can be text of any length and complexity.) To move to the other position use the ← key.

Text in the **b** and **c** positions is scaled to 75% of the height of the text at **a** (the current font size).

The next four symbols are inserted at the cursor and do not require a selected region of text. The cursor is moved to the position shown as **a**. Text in the **a** and **b** positions is scaled to 75% of the current font size.

The **limits** switch (described later) selects whether text in the **a** and **b** positions is (i) above and below the symbol, or (ii) in the superscript and subscript positions. (**a** and **b** can be text of any length and complexity.)

\sum_a^b Summation. Keyboard short-cut: *Ctrl-S*

\prod_a^b Product. Keyboard short-cut: *Ctrl-F*

\int_a^b Integral. Keyboard short-cut: *Ctrl-I*

\oint_a^b Ointegral. Keyboard short-cut: *Ctrl-O*

The next two lines contain different accent characters.

^	~	ˇ	˘	¨
â	ã	ä	å	ä
ā	ā	ä	ā	ā

These accents are applied to a selected region of text. They can be inserted either above or below the character depending on the setting of the **options** switch (described later). If required, you can stack several accents above each other.

You can allocate keyboard short-cuts to any of the accents; there are no default short-cuts set.

The next line contains various shapes of brackets.

ˆ	˘	˘	<	>
[a]	|a|	(a)	<a>	{a}

You can either:

- insert brackets at the cursor and then enter text inside them, or
- insert brackets around a selected region of text.

If the text inside brackets subsequently expands or contracts vertically, the brackets expand or contract to match.

You can allocate keyboard short-cuts to select any of the brackets; there are no default short-cuts set.

Limits switch

	\dots	\dots	$\{d\}$	$\{a\}$	$\{d\}$
limits	above/below				✓
	sub/super				

This applies to the characters shown in the **a** and **b** positions for

summation

product

integral

Ointegral.

Above/below – **a** and **b** are immediately above or below the symbol.

Sub/super – **a** and **b** are subscript or superscript characters

Divide switch

	SUB.	SUP.
divide	numerator	✓
	denominator	

This sets the action of clicking on the **divide** icon.

Numerator – the division line is placed below the selected text and the new cursor position is below the division line.

Denominator – the division line is placed above the selected text and the new cursor position is above the division line.

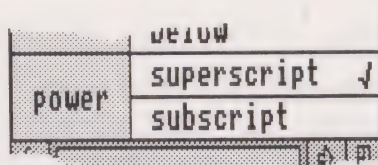
Accents switch

	above	below
accents	✓	

Above – accents are placed above characters.

Below – accents are placed below characters.

Power switch



You can place powers both above and below the preceding character but normally you only want them in one position. This switch selects which position the cursor moves to after clicking on the **power** icon. To move to the other position use the ← key to step backwards.

Superscript – the cursor moves to the superscript position.

Subscript – the cursor moves to the subscript position.

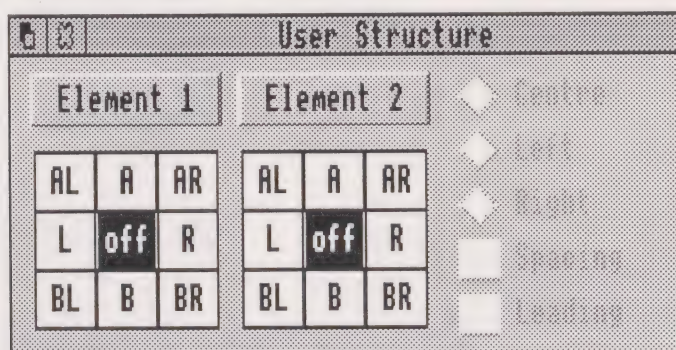
Design/Apply

This allows you to design a basic data structure which can then be used several times in the document or in different documents. There is an example of its use at the end of this description.

It provides an easy way to add formatted text to existing expressions. Text inserted using D/A is not scaled to 75% as would text applied using the **power** tool.

The Design (D) option

To display the Design dialogue box click on the **D** of the **D/A** icon. (If you have just started up Equasor and not yet begun an equation, clicking on this icon has no effect. Start an equation and try again.)



Click on the Close icon to remove the dialogue box from the screen. The current parameter settings are remembered and can still be Applied.

Element 1

The setting in this box determines where the cursor moves to when you click on the **A** (apply) character of the **D/A** tool. The six switches surrounding the **off** switch are 'compass points' (AL - above left, A - above, AR - above right, and so on). Only one of the seven switches can be selected at any time, so clicking on a new switch cancels the previous setting.

If the **off** switch is selected, this box is ignored and the cursor moves to the position set in **Element 2**.

Element 2

Operation of this box is similar to Element 1.

If the **off** switch is selected, this box is ignored and the cursor moves to the right of the data structure. If **off** is selected in both boxes, clicking on Apply has no effect.

Centre

Left

Right

These three radio switches are greyed unless one of the **above** (A) switches or **below** (B) switches is selected in either Element 1 or Element 2. As these are radio switches, only one of the three switches can be selected at any time.

These switches determine the alignment of the text inserted above or below the existing text. Their effect is shown below:

centre
existing - text

left
existing - text

right
existing - text

Spacing

This switch is greyed unless one of the three **left** (AL, L, BL) switches or one of the three **right** (AR, R, BR) switches is selected in either Element 1 or Element 2.

If the switch is **off**, there is no extra horizontal offset from the existing text.

If the switch is **on**, text is offset by the **spacing** value set in **Style**. Note that with spacing set to its default value, text is only slightly offset if this switch is on.

text^{added} Spacing switch not set

text^{added} Spacing switch set

Leading

Operation of this switch is similar to the **Spacing** switch just described. It is greyed unless one of the three **above** (AL, A, AR) switches or one of the three **below** (BL, B, BR) switches is selected in either Element 1 or Element 2.

If the switch is **off**, there is no extra vertical offset from the existing text.

If the switch is **on**, text is offset by the **leading** value set in **Style**.

text^{applied} **Leading switch off**

text^{applied} **Leading switch on**

The Apply (A) option

Clicking on the **A** of the **D/A** icon only has an effect if there is a selected region of text. Selecting text is described in *Using Equasor*.

Clicking on **A** applies the structure you created in the Design dialogue box to the selected region. (It also deselects the region of text.) The cursor moves first to the position you specified for Element 1. Enter the required text for this position and then press the → key. This moves the cursor to the position you specified for Element 2. Enter the required text for this position and again press the → key. This moves the cursor outside of the structure.

If **off** is selected for either Element 1 or Element 2, the cursor ignores that element. If **off** is selected for both elements, no action takes place and the region of text is not deselected.

Using Design/Apply

This is a very powerful and flexible feature of Equasor, but its flexibility makes it complicated. This illustration of its use may help you to understand its application.

existing-text is the region of text that was selected

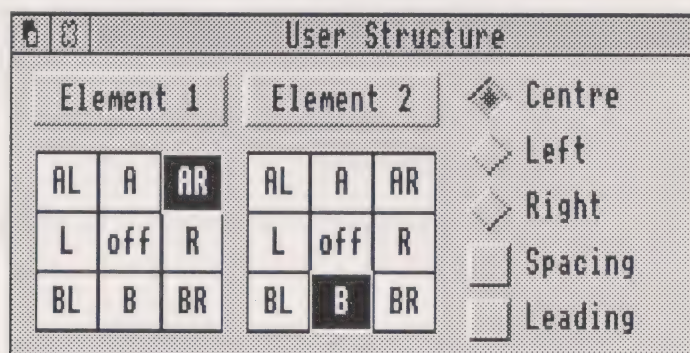
E1 is the text entered at the Element 1 position

E2 is the text entered at the Element 2 position

Q3 is text entered after pressing → for the second time.

Spacing and Leading were not used.

The dialogue box was set up thus:



which gives this effect:

existing - text ^{E1} Q3
E2

6. Symbols display

[][]		Symbols																								[]			
MathGreek										1	Next	Previous													[]				
Α	Β	Χ	Δ	Ε	Φ	Γ	Η	Ι	Θ	Κ	Λ	Μ	Ν	Ο	Π	Ρ	Σ	Τ	Υ	ς	Ω	Ξ	Ψ	Ζ			[]		
α	β	χ	δ	ε	φ	γ	η	ι	θ	κ	λ	μ	ν	ο	π	ρ	σ	τ	υ	ω	ξ	ψ	ζ			[]			
	!	"	#	\$	%	&	'	(	)	*	+	.	-	_	/	0	1	2	3	4	5	6	7	8	9			[]
:	:	<	=	>	?	-	\	|	^	_	'	|	|	}	~											Δ	...	[]	
		/	f	%	*	'	'	:	:	"	"	..	-	---	-	≠	≡	≡	∞	≡						±	'	[]	
©	®	™	∠	°	♣	♠	♥	♠					°	±	"	©	®	™	℥	,						κ	§	[]	
℥	ρ	Υ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	[]	
⊗	×	⊗	≡	√	Δ	Ε	Υ	Π	Σ	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	⊗	⊗	⊗	[]
ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	ε	[]	
[]																									[]				

Use the Main Menu option **Symbols** to bring up the symbols display window. It allows you to directly select characters from a particular font, primarily *MathGreek*. There can be up to eight fonts loaded in the Symbols display.

Note that when you first open the window, it only shows part of the available character set. This minimises the area of the screen that it obscures. (For details of resizing RISC OS windows, refer to the *Archimedes' User Guide*). Like the other windows in Equasor, you can drag most of the Symbols display window off the sides and bottom of the screen. Click on the Close icon to remove the window from the screen.

When you start-up Equasor, only the *MathGreek* font is loaded in the Symbols display. Use the Symbols display menu (described later) to add more fonts.

To change the font displayed in the window either:

- use the **Show font** menu option (described later), or
- click on the **Next** and **Previous** boxes to move forwards and backwards through the fonts.

The number to the left of **Next** shows which of the eight fonts is displayed in the window.

Click on a character in the window to insert it into an equation at the cursor position.

Font display menu

To display this menu, position the mouse pointer over the window and click **Menu**. This displays a small menu:

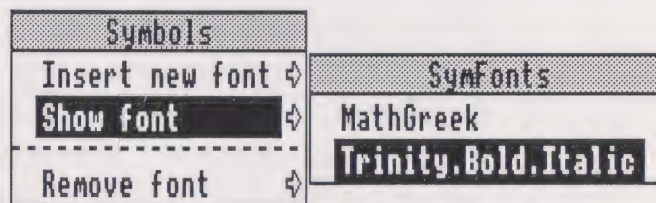


Insert new font

Slide the mouse pointer over the arrow to the right to display a menu of the available fonts. Click on the name of the font you want to add to the Symbols display.

If you try to load more than eight fonts, an alert box appears to warn you that only eight fonts are allowed.

Show font



Slide the mouse pointer over the arrow to the right to display a menu of the currently loaded fonts. To display a font in the window, click on its name.

This is an alternative to clicking on the **Next/Previous** boxes on the window to change the font displayed in the window.

Remove font

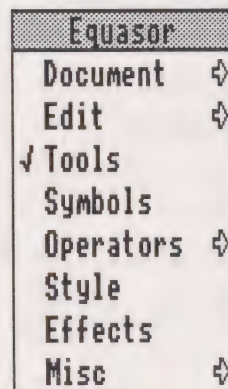
The operation of this option is similar to **Show font**.

Slide the mouse pointer over the arrow to the right to display a menu of the currently loaded fonts. To remove a font, click on its name.

Only fonts 2 to 8 (those loaded using **Insert new font**) can be removed. Font 1 (*MathGreek*) cannot be removed.

7. Main Menu

To display the Main Menu, move the mouse pointer over the main Equasor window and click on **Menu**.



Some of the menu items have a small arrow to their right. Slide the mouse pointer over this arrow to display a further submenu. The other options are selected simply by clicking on their name. This is the standard way of choosing from Archimedes' menus.

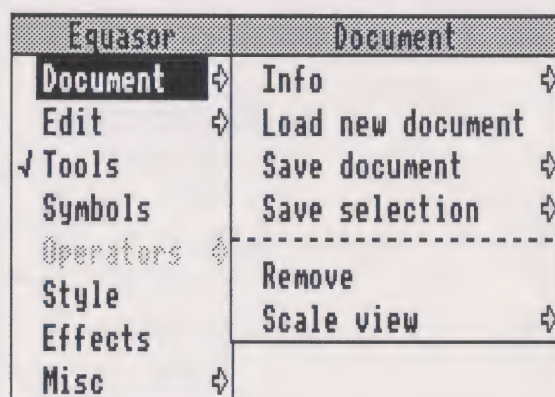
Menu items are *greyed* (shown in light grey) if they are not available. For example, until you create an equation you cannot save it. So, in the Document submenu, the **Save document** option is initially greyed and only becomes available when you start creating an equation.

A tick may be shown to the left of certain options (they may be *ticked*). This shows that these windows or dialogue boxes are already displayed on the screen (although they may be hidden behind other windows or largely slid off the sides or bottom of the screen). If the window or dialogue box is hidden behind other windows, you can bring it to the front by clicking on the option name.

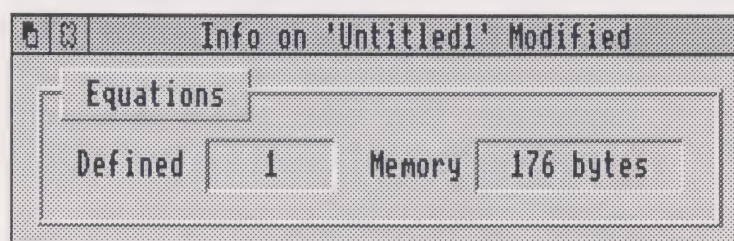
If the option is not ticked, click on its name to display it. To close a window, click on its Close icon; to close a dialogue box, click on either **OK** or **Cancel**.

You can also choose most of the menu options from the keyboard. Where this applies, it is shown in the description for that option. (Appendix 2 contains a complete list of keyboard short-cuts.)

Document



Info



Keyboard short-cut: *Ctrl-F1*

A small information box tells you:

- the number of separate equations on this document, and
- the amount of memory used by those equations.

The title bar tells you if the document is unchanged since the last save (**unmodified**) or if the document has unsaved changes (**modified**).

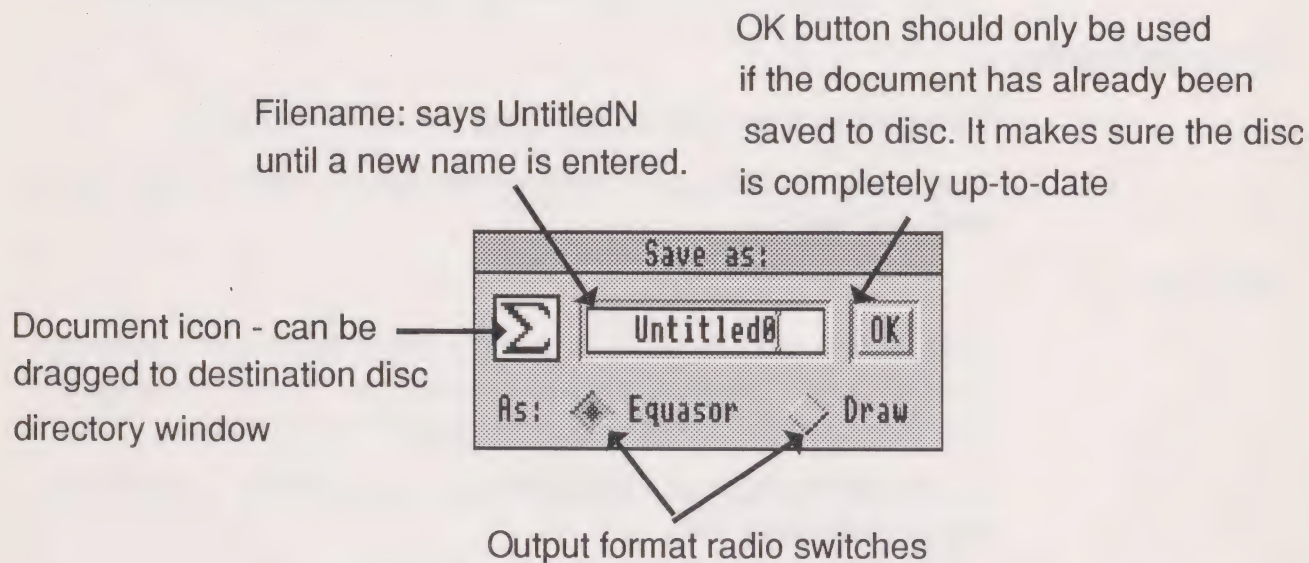
Load new document

An alert box tells you how to load an Equasor document from disc. A document can be loaded by:

- double-clicking on its icon, or
- dropping its icon onto an Equasor window.

Loading existing documents is described in more detail in *Using Equasor*.

Save document



Keyboard short-cut: *Ctrl-F3*

This option is greyed if the document has no equations on it.

Sliding the mouse pointer over the arrow to the right of this option displays the small dialogue box shown above.

If you are saving a document for the first time or saving to a different directory, you

1. make any changes required to the file name in the editable field, and then
2. drop the document icon onto the required directory window.

If you do not change the name in the editable field, a new Equasor document is saved with the default name of *UntitledN* where *N* is a sequence number.

To resave a file, click on the **OK** box or press *Return*.

There are two formats in which you can save a document:



- as an Equasor file – files in this format can be loaded into Impression (issue 2.05 or later), Impression Junior (issue 1.05 or later) or reloaded into Equasor for further editing, or



- as a Draw file – files in this format can be loaded into other applications but cannot be reloaded into Equasor.

Files saved in the Equasor format use a full implementation of Acorn's Draw specification. However, most applications can

only recognise files in the partial implementation used in the *!Draw* application. Hence, two save formats are provided.

Save selection

This option is greyed unless there is a selected region.

Operation is similar to **Save document** for both initial saves and resaves.

Remove

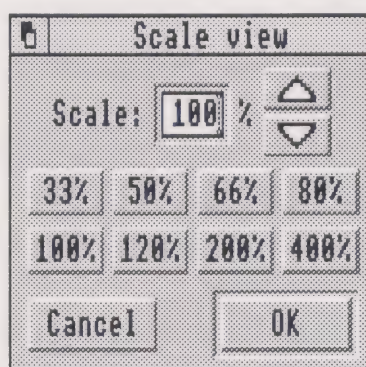
This is the only way to remove a document from memory. Unlike most other applications such as *!Draw*, closing the window does not remove the document from memory.

If you have made changes and not saved them, an alert box appears to warn you.

Click on **Remove** to remove the document.

Click on **Cancel** or press *Esc* to return to the Equasor window.

Scale view



Keyboard short-cut: *Ctrl-F9*

This allows you to zoom in or out on your view of the document. The default size can be changed in **Preferences** in the Program Menu. Smaller scalings give a reduced image; greater scalings give an enlarged image. The range is 1% to 999%.

To change the scale you can

- type a new value into the editable field, or
- use the bump icons (to the right of the editable field) to change the scaling in steps of 1%, or
- choose one of the predefined values, or
- use *Shift-F1* to *Shift-F10* to select scalings between 10% (*Shift-F1*) to 100% (*Shift-F10*) with the other keys giving the

intermediate 10% steps, or

- use *Shift-F11* to halve the current scaling, or
- use *Shift-F12* to double the current scaling.

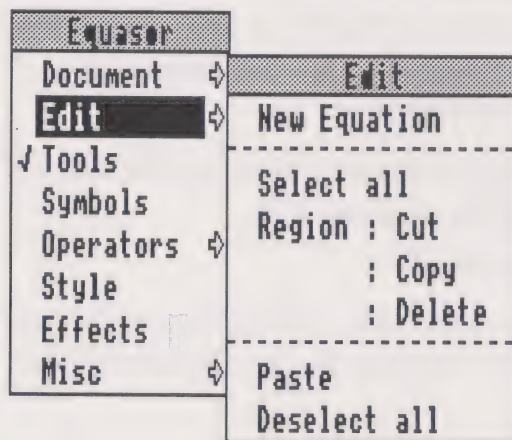
After selecting a new value, either click on **OK** or press *Return* to implement it.

To quit without changing the scaling either

- click on **Cancel**, or
- press *Esc*.

Note that you only change your view on the document. The size of the text in the document itself does not change.

Edit



New equation

Keyboard short-cut: *Ctrl-A*

Use this option to start a new equation.

The mouse pointer tracks a pair of cross-wires. Use the mouse to move these to where you want to start your new equation and then click **Select**. The cross-wires disappear and the cursor appears above the mouse pointer. You can now start building the equation.

Select all

Keyboard short-cut: *Ctrl-T*

This option is greyed until you start building an equation. It is also greyed when there is a selected region.

Choose this to select the entire current equation. (The *current equation* is the equation that contains the cursor or a selected region.)

Region: Cut

Keyboard short-cut: *Ctrl-X*

This option is greyed unless there is a selected region.

This removes (cuts) the selected region from the equation and puts it on the clipboard. You can then paste that region into another part of your document or another Equasor document.

Any existing contents of the clipboard are over-written and are lost.

: Copy

Keyboard short-cut: *Ctrl-C*

This option is greyed unless there is a selected region.

This copies the selected region to the clipboard. The selected region remains in the equation and is unchanged. You can then paste that copy into another part of your document or another Equasor document.

Any existing contents of the clipboard are over-written and are lost.

: Delete

Keyboard short-cut: *Ctrl-K*

This option is greyed unless there is a selected region.

This deletes the selected region. Use this option with care as no copy is kept of the deleted text and you cannot undo this operation. It is generally preferable to use **Cut** to remove unwanted regions.

Paste

Keyboard short-cut: *Insert* or *Ctrl-V*

This option is greyed if the clipboard is empty.

Text held on the clipboard is pasted into the equation at the current cursor position. The cursor is then repositioned at the end of the inserted text.

The clipboard contents are not destroyed by this operation and can be pasted again if required. This is useful if you want to duplicate parts of an equation.

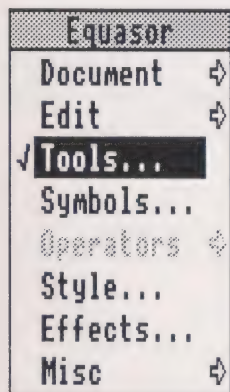
Deselect all

Keyboard short-cut: *Ctrl-Z*

This option is greyed unless there is a selected region.

Choosing this option deselects the selected region. The text of the equation is unchanged.

Tools



Keyboard short-cut: *Ctrl-F4*

When you open the Equasor window the Tools are displayed. (The Tools are described in a separate chapter.)

If the Tools window is already open, a tick is shown against its option name. To close the Tools window, click on its Close icon; this removes the tick against the option name.

You can also click on the Back icon to put the Tools window behind other windows. (You might choose to hide it if you enlarge an equation to examine it in detail and you require all the screen.) Click on the option name to make Tools the front window.

If this option name is not ticked, click on the name to open the Tools window. A tick then appears against the option name.

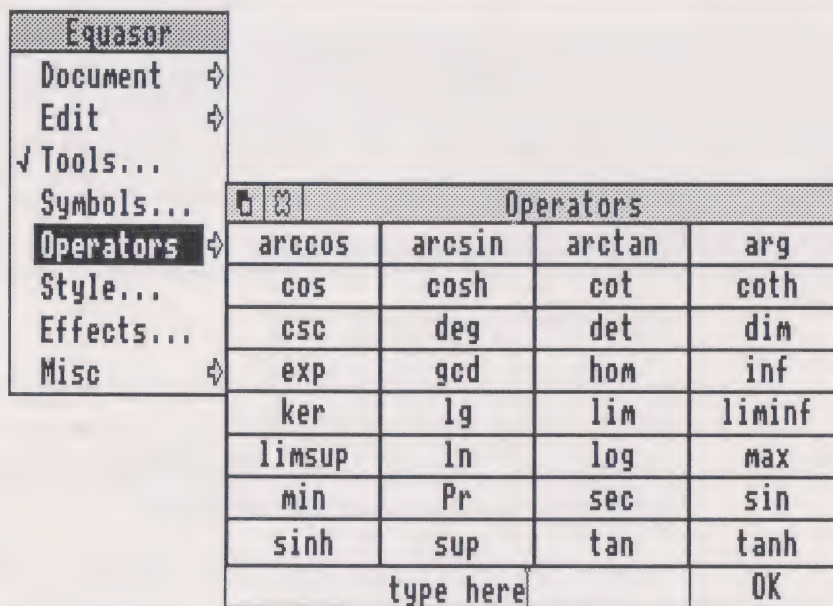
		Symbols																								
MathGreek										I	Next	Previous														
Α	Β	Χ	Δ	Ε	Φ	Γ	Η	Ι	Θ	Κ	Λ	Μ	Ν	Ο	Π	Θ	Ρ	Σ	Τ	Υ	Ζ	Ω	Ξ	Ψ	Ζ	
α	β	χ	δ	ε	φ	γ	η	ι	θ	κ	λ	μ	ν	ο	π	θ	ρ	σ	τ	υ	ω	ω	ξ	ψ	ζ	
	!	"	#	\$	%	&	'	(	)	*	+	,	=	.	/	0	1	2	3	4	5	6	7	8	9	

Click on this to display the Symbols window (this is described in a separate chapter). This provides a quick way to select characters from a font. (Appendix 1 shows all the available characters in the MathGreek font.)

Note that when you open the window it shows only half the available character set. This minimises the area of the screen covered by the symbols' window. Scroll down or increase the size of the window to see the other symbols.

To insert a character, first position the cursor in the text and then click on the required character. It is inserted into the equation at the cursor and the cursor moves one place right.

Operators



This option is greyed if either:

- there is a selected region,
- there is no cursor displayed in this document.

Position the cursor before clicking on this option.

Move the mouse pointer off the Operators window to remove the window from the screen

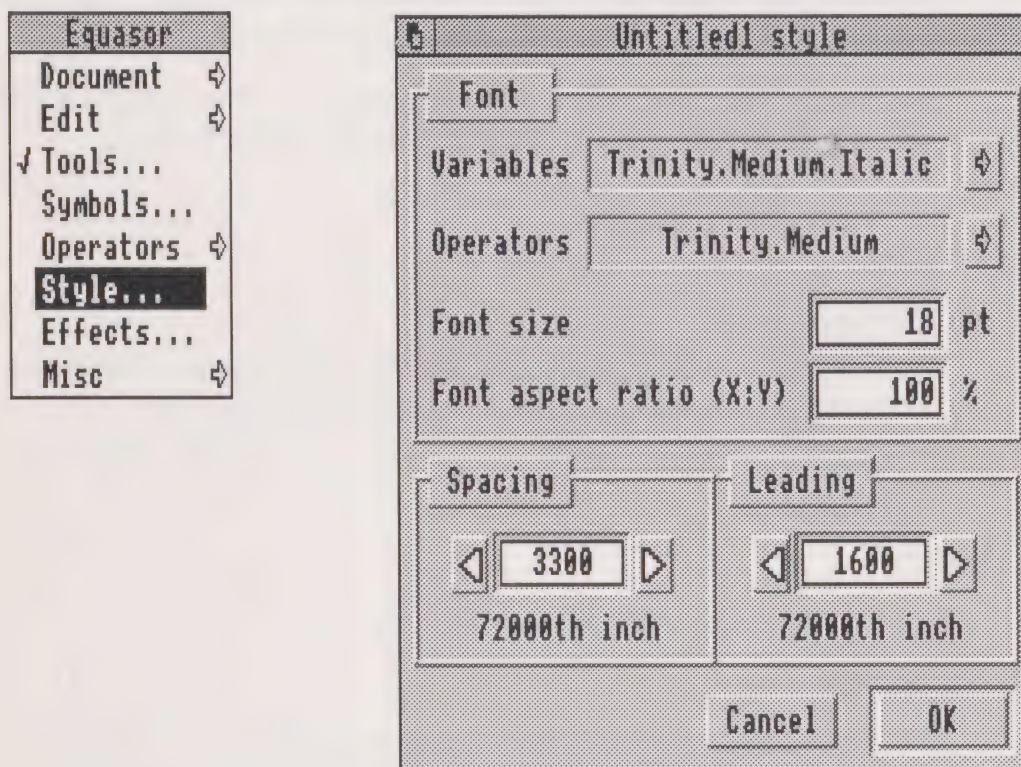
Click on the required operator name to insert that operator into the equation at the cursor. The cursor is repositioned to the right of the operator name.

At the bottom of the display is an editable field. If you type into this field (up to 12 characters) and then click on **OK**, the contents of the field are copied into the equation at the cursor. (In the illustration above, this field contains *type here*.)

Note that text from this display appears in the *Operators* type style (normally 18pt Trinity Medium). If you were to type the same text directly from the keyboard, it would appear in the *Variables* type style (normally 18pt Trinity Medium Italic).

The *Operators* type style can be changed using the **Style** menu option.

Style



Keyboard short-cut: *Ctrl-F6*

Use this option to set the type styles for your equations.

Any changes made using this dialogue box apply to all the text in the current document. To change only part of the text in the document, use the *Effects* option.

Using dialogue boxes is described in the *Introduction* chapter of this manual.

OK

Pressing *Return* has the same effect as clicking on this button.

Click on this button to implement any changes you have made in this dialogue box.

Cancel

Click on this button to cancel any changes that have not yet been incorporated into the document. (Changes are only incorporated into the document when you click on **OK**.)

Font

Fonts and font sizes are described in the *Introduction* chapter of this manual.

Variables

Variables are characters you insert directly from the keyboard or select from tools or from the Symbols display.

To change the font, click on the arrow to the right of the editable field to display a menu of the available fonts.

Click on the name of a font to select it.

Operators

Operators are

- unary (monadic) arithmetic functions (such as *arccos*, *log*, *tan*) selected using the menu option **Operators**, or
- binary operators (such as +, -, ×, /) selected from any source.

Font size

Type in the required font size (height).

Font aspect ratio

This determines the ratio between the width and the height of the characters. 100% is the ratio intended by the font designer. Use ratios less than 100% for narrower characters, more than 100% for wider characters.

Spacing

This is the horizontal separation automatically inserted around operators such as + and functions such as **square root**. This option does not control the space inserted when you press *Space* on the keyboard; that is controlled by **Preferences** in the Program Menu.

Spacing is defined in steps of 1/72,000th of an inch (1/1,000th of a point; approximately, 0.00035 mm). To change the value, either:

- enter a new value into the editable field, or
- click on the bump icons either side of the editable field to change the value in steps of 10/72,000.

$ab + cd$ Default spacing of 3,300 (0.045 inch)

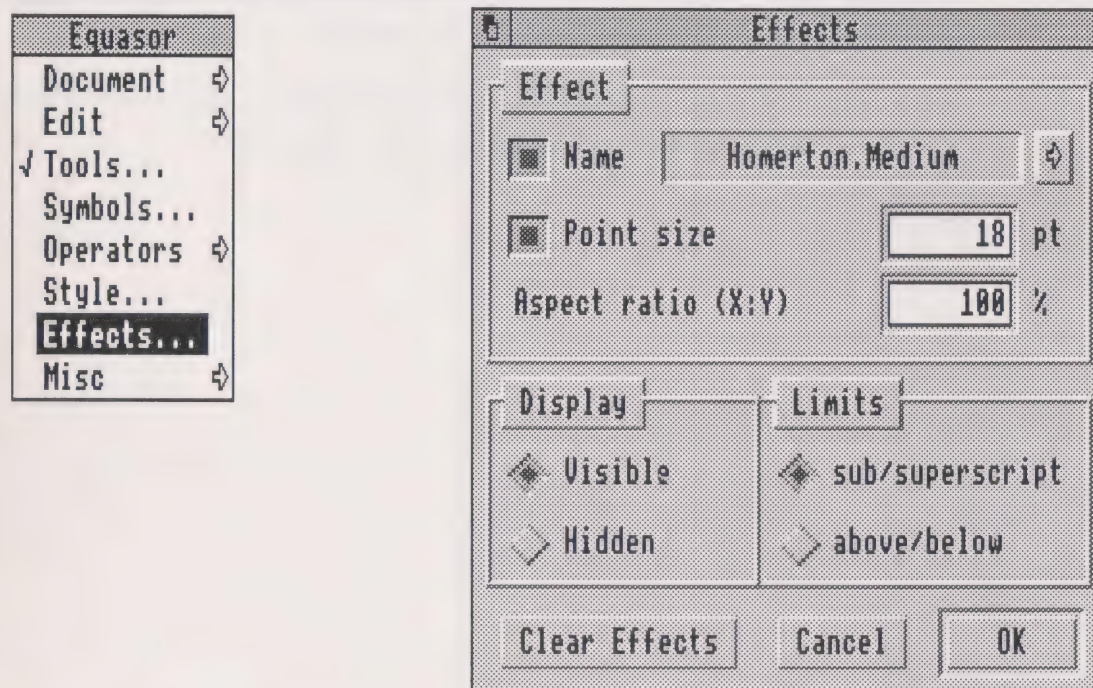
$ab \quad + \quad cd$ Spacing of 18,000 (0.25 inch)

Leading

(Pronounced *led*ding. It originally referred to the strips of lead used to separate lines of text set in metal.)

This is the vertical separation between lines of text. Change its value in the same way as described for Spacing.

Effects



Keyboard short-cut: *Ctrl-F7*

This option is greyed unless there is a selected region of text.

The dialogue box allows you to change the appearance of parts of an equation. This is useful if you want to highlight something in an equation or to set a minimum font size.

Using dialogue boxes is described in the *Introduction* chapter of this manual.

OK

Pressing *Return* has the same effect as clicking on this button.

Click on this button to implement any changes you have made in this dialogue box.

Cancel

Click on this button to cancel any changes that have not yet been incorporated into the document. (The document is only changed when you click on **OK** or **Clear effects**.)

Clear effects

Click on this to clear any effects currently applied to the selected region.

Effect

Fonts and font sizes are described in the *Introduction* chapter of this manual.

The editable fields **Name** and **Point size** display,

- if a single character is selected, the font and size of that character, or,
- if a region is selected, the current *Operators* font and font size.

Name

This option is greyed unless the switch to the left of the name is **on**. This lets you set other effects without changing the fonts used in the selected region. (The switch is set **on** if a single character is selected and an effect has already been applied to that character.) Click on the switch to alternate between **on** and **off**.

Click on the arrow to the right of the editable field to display a menu of the available fonts.

Click on the name of a font to select it.

Point size

The operation of this option is similar to the **Name** option already described.

Type in the required font size (height).

Aspect ratio (X:Y)

This option is greyed unless the switch to the left of **Point size** is **on**.

Changing the aspect ratio changes the width of the characters. Ratios greater than 100% give wider characters; less than 100% narrower characters. (200% gives characters twice as wide as normal; 50% half as wide as normal.)

Display

This option is greyed if the selected region covers more than one character.

Visible

Click on this switch to cancel a previously applied **Hidden** effect.

Hidden

Click on this switch to make the selected region invisible. It will still exist in the equation and can be restored by clicking on **Visible**.

This option is useful if you want to show only one of a pair of enclosing brackets. Insert the enclosing brackets into the equation as normal, select the unwanted bracket, and then click on **Hidden**.

Limits

This option is greyed unless the selected region includes one of these functions:

- summation
- product
- integral
- Ointegral.

Its use is similar to the **Limits switch** in the Tools display except that it allows you to change existing text.

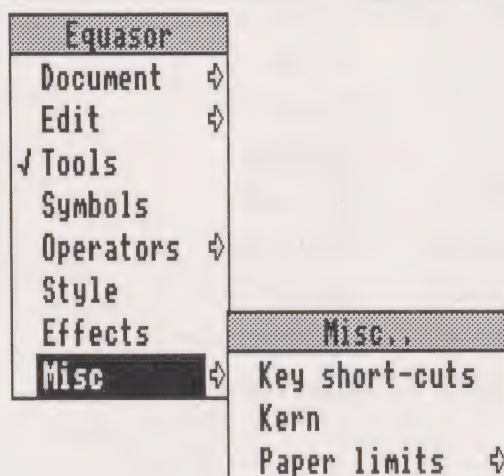
Sub/superscript

Limits are displayed in the subscript and superscript positions of the function.

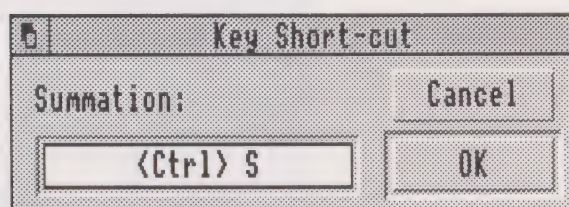
Above/below

Limits are displayed above and below the function to which they apply.

Misc



Key short-cuts



The functions in **Tools** can also be selected using control codes typed on the keyboard. The accent characters and the brackets do not have default control codes allocated to them. If you want to change some of these control codes or if you want to allocate codes to the accents or the brackets, use this menu option.









Acceptable short-cuts are **Ctrl-A** to **Ctrl-Z** and the 12 function keys. Be careful: many of the control codes A to Z are used for selecting menu options. If you allocate one of these codes to a Tools function, it will no longer select the menu option. (Appendix 2 has a complete list of control codes and their allocations.)

When the short-cut dialogue box is on screen, click on the appropriate symbol in the tools display. The name of the symbol and any existing key short-cut are displayed in the dialogue box. To enter a new short-cut character press down the *Ctrl* key and then type the character. The new character is displayed in the dialogue box.

To implement a change either click on the **OK** button or press *Return*. If you click on another symbol in the tools display without clicking on **OK** or pressing *Return*, any change is lost.

To cancel, click on **Cancel** or the close icon or press *Esc*.

The default keys are:

Ctrl-D  divide
Ctrl-F  product
Ctrl-I  integral
Ctrl-N  nth root
Ctrl-O  Ointegral
Ctrl-P  power
Ctrl-Q  square root
Ctrl-S  summation.

Kern



Keyboard short-cut: *Ctrl-F2*

This option is greyed if there is a selected region.

Certain character pairings appear either cramped together or too widely spaced. An example is AVE where there is a wider space between AV than VE. Horizontal kerning allows you to increase or decrease the space between two characters to overcome this effect.

Vertical kerning similarly increases or decreases the distance between two lines to give a balanced look. It can also be used to vertically offset part of a line.

The measurement used is an **em** which is the width of the character **M**. It is a widely used measurement in typesetting because it is relative to the font size – a 20pt em is wider than a 10pt em. If you change the font size, em spacings automatically adjust to the new size whereas measurements in centimetres or inches would not.

Kerning is applied locally between two characters or two lines. It does not alter all the spacings in the equation. To do that, use the **Spacing** and **Leading** options in **Style**.

Clear

To cancel previously set kerning, position the cursor to where the kerning was applied and click on **Clear**.

Cancel

Click on **Cancel** to quit without making changes. *Esc* has the same effect.

Set

As previously described, any changes are only made permanent when you click on this box. If you click using **Select**, the dialogue box is closed; if you use **Adjust**, it remains on the screen and you can make further adjustments.

Horizontal

Position the cursor between the character pair. You can change the kerning by:

- Entering a new value in the editable field. To implement the new value, you must click on **Set** or press *Return*. If you quit without setting, any changes are lost.
- Clicking on the bump icons to the right of the box to change the kerning in steps of 10/1000ths (that is 0.01) of an em. The arrows work logically – the left arrow decreases the separation, the right arrow increases it. As you click on the arrows the characters move to show the effect. This is only a temporary change; to make it permanent you must click on **Set** or press *Return*. If you quit without setting, any changes are lost.
- Using the keyboard (each key-press changes the kerning by 50/1000ths (0.05) of an em):

Ctrl-E increases the kerning, and

Ctrl-R decreases the kerning.

Vertical

This operates in a similar way to horizontal kerning.

Position the cursor in the lower of the two lines where you want kerning to start. Remember to **Set** any changes you make.

On the keyboard:

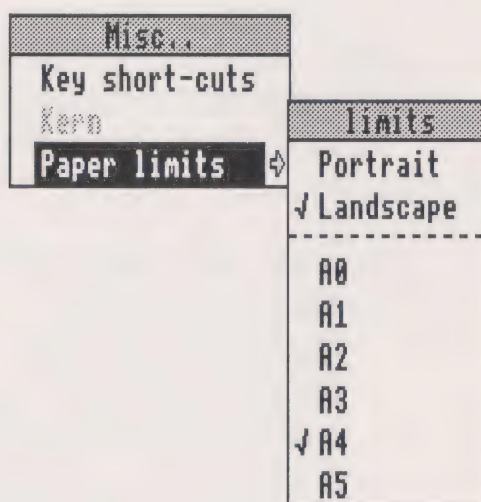
Ctrl-J moves text down, and

Ctrl-U moves text up.

If you want to kern the entire line, position the cursor at the start of the line.

You may want to kern only a part of a line. For example, suppose you have a line **abcd** and want to kern **bc** upwards (**abcd**). Position the cursor after **a** and kern **bcd** upwards. Reposition the cursor after **c** and kern **d** down to its original alignment.

Paper limits



Use this option to change the size of the document. The default document (the document that appears when you click on the Equasor icon) is A4-sized (210 mm × 297 mm), portrait-orientated.

Slide over the arrow to the right of the option name to display a further menu. On this menu, the currently selected values are shown with a tick against them. There are always two ticked options:

either **landscape** or **portrait**

one of the paper sizes **A0** to **A5**.

To choose a different value, click on its name. The tick is removed from the original option and appears against the option you have just chosen.

Be careful if you choose a smaller size of paper – any text that lies outside of the new page boundaries is ignored. (Such text can be retrieved by resetting to a larger paper size.)

Portrait

The document is orientated with the long sides vertical. (Pages in this manual are portrait-orientated.)

Landscape

The document is orientated with the long sides horizontal.

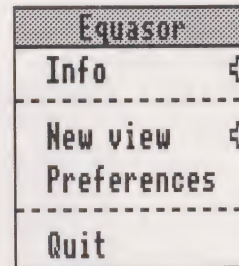
A0 to A5

These options select the document size.

size	(in mm)	(in inches)
A0	841 × 1189	33.1 × 46.8
A1	594 × 841	23.4 × 33.1
A2	420 × 594	16.5 × 23.4
A3	297 × 420	11.7 × 16.5
A4	210 × 297	8.3 × 11.7
A5	148 × 210	5.8 × 8.3

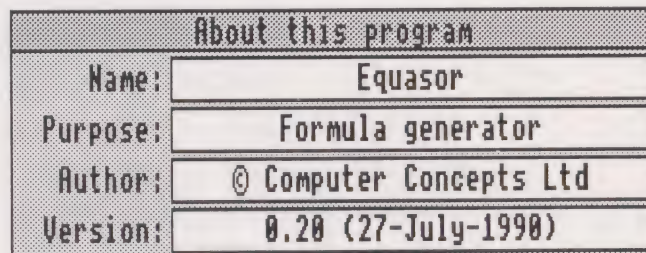
8. Program menu

The program menu controls features of the Equasor application rather than individual documents. To display it, position the mouse pointer over the Equasor icon on the icon bar and click **Menu**.



Some of the menu items have a small arrow to their right. Slide the mouse pointer over the arrow to display a further submenu or an information box. The other options are selected by clicking on their name. This is the standard way of choosing from Archimedes' menus.

Info



This displays an information box about Equasor. The most important item is **Version**. If you have a query about Equasor, note down the issue number and date shown in this box before calling Computer Concepts.

In the illustration, the issue and date are

0.20 27th July 1990

New view

This option is greyed (not available) if there are no documents loaded in memory.

When you close an Equasor window you do not delete the document from memory. If you later want to find out which documents are currently in memory, choose this option. If a

document's name is ticked, a window is currently open onto that document.

To open a window on a closed document simply click on its name. You cannot have two windows open on the same document.

Preferences



This dialogue box allows you to change the default values whilst Equasor is running. It also allows you to save the current preferences in the Equasor application so that these become the defaults.

Changing any of these preferences does not alter a document or any text already displayed. Changes only apply to documents opened subsequently or to text entered after you click on **OK** or **Save**.

Click on **OK** to use, but not save, the new preferences.

Click on **Cancel** to ignore any changes made to the preferences.

Click on **Save** to use the new preferences and also save them within Equasor, so that they will also take effect each time Equasor is loaded.

Scale – Document

When you open a window on an Equasor document, this option sets the scale of that window.

Keys

Return

When you press *Return*, a new equation is started below the equation currently containing the cursor (the *current equation*). This option controls where the cursor is placed.

Click on the arrow to the right of the field to display a small menu. To change the current setting, choose a new setting from this menu.

Return to = aligns the cursor with any = sign in the current equation. If there is more than one = in the equation, the cursor is aligned with the left-most. If there is no =, *Returns* are ignored.

Return to start aligns the cursor with the left-hand side of the current equation.

Return to end aligns the cursor with the right-hand side of the current equation.

Tab

When you press the *Tab* key on the keyboard, a space is inserted into the equation with the value in this editable field. The default is 1600 (1.6 times the width of the character **M** in the current font).

If you change this value whilst creating an equation, any tab characters already in the equation are unchanged. All new tab characters take the value set in this field.

Space

This is similar in operation to **Tab** described above.

Space characters are converted into a space of the value in this field. The default is 400 (just under half the width of an **M**).

Quit

Choose this option to close the Equasor application and remove all documents from memory.

If any documents have unsaved changes, an alert box appears to warn you.

Click on **Quit** or press *Return* to quit and discard those changes.

Click on **Cancel** or press *Esc* to retain Equasor and all current documents in memory.

Appendix 1 - The MathGreek font

These are the characters available in the MathGreek font. They are arranged as they appear in the Symbols table and are shown enlarged:

line 1	65	A	B	X	Δ	E	70	Φ	Γ	H	I	75	ϑ	K	Λ	M	
		N	O	Π	Θ	P	Σ	T	Υ	ς	Ω	Ξ	Ψ	Z		90	
line 2	97	α	β	χ	100	δ	ε	φ	φ	η	105	ι	φ	κ	λ	μ	
	110	ν	ο	π	θ	ρ	115	σ	τ	υ	ϖ	ω	ξ	ψ	ζ	122	
line 3		!	"	35	#	\$	%	&	'	40	()	*	+	,		
	45	-	.	/	0	1	50	2	3	4	5	6	7	8	9		
line 4		:	;	60	<	=	>	?	-	64	92	\]	^	_	`	{
			}	~										∴	...		
line 5				140	/	f	% ₀₀	•	'	'	<	>	"	"			
	150	„	-	—	-	≠	≡	≈	≡	∞	∞		160	±	'		
line 6		©	®	165	™	∠	◦	♣	♦	170	♥	♠				175	
		◊	±	"	©	®	180	™	✕	.				×	ℑ		
line 7	190	ℜ	℔	Υ	^	~	.	195	..	-	≤	≤	200	≪	<	∫	
		⊥	↔	←	205	↑	→	↓	⊂	⊆	210	⊄	⊃	⊇	⊃	⊃	

line 8 (the accent symbols are enlarged more than the others)

\otimes ²¹⁵ \times \emptyset \neg $\sqrt{}$ ∇ Ξ ²²⁰ \forall Π Σ \wedge ²²⁵ \sim \cdot
 $\ddot{}$ $-$ \geq ²³⁰ \geq \gg \rangle \oint $|$ \Leftrightarrow \Leftarrow \Uparrow \Rightarrow \Downarrow

line 9

²⁴⁰ \in \supseteq \notin \ni \nexists \cup \oplus \div \diamond \llcorner ²⁵⁰ $\overline{}$ ∂ \wedge
 \vee \ni

Appendix 2 - Keyboard short-cuts

Short-cuts marked † select functions from Tools; they can be changed using the menu option **Key short-cuts**.

Ctrl-A	New equation
Ctrl-B	Select object to left of cursor
Ctrl-C	Copy selected item to clipboard
† Ctrl-D	Divide
Ctrl-E	Horizontal kern (expand space)
† Ctrl-F	Product
Ctrl-G	— <i>not used</i> —
Ctrl-H	— <i>not used</i> —
† Ctrl-I	Integral
Ctrl-J	Vertical kern (move down)
Ctrl-K	Delete item
Ctrl-L	— <i>not used</i> —
Ctrl-M	— <i>not used</i> —
† Ctrl-N	Nth root
† Ctrl-O	Ointegral
† Ctrl-P	Power
† Ctrl-Q	Square root
Ctrl-R	Horizontal kern (decrease space)
† Ctrl-S	Summation
Ctrl-T	Select all
Ctrl-U	Vertical kern (move up)
Ctrl-V	Paste clipboard contents
Ctrl-W	— <i>not used</i> —
Ctrl-X	Cut selected item to clipboard
Ctrl-Y	— <i>not used</i> —
Ctrl-Z	Deselect region
Ctrl-F1	Info dialogue
Ctrl-F2	Kern dialogue
Ctrl-F3	Save dialogue
Ctrl-F4	Tools dialogue
Ctrl-F5	Symbols dialogue
Ctrl-F6	Style dialogue
Ctrl-F7	Effects dialogue
Ctrl-F8	— <i>not used</i> —
Ctrl-F9	Scale view dialogue
Ctrl-F10	— <i>not used</i> —
Ctrl-F11	— <i>not used</i> —
Ctrl-F12	— <i>not used</i> —

Shift-F1 to F10	Scale current window from 10% to 100% actual size
Shift-F11	Scale current window to half present size
Shift-F12	Scale current window to twice present size

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